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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARTIN FRANZ and PEDER ANDREAS OLSEN

Appeal 2007-4297
Application 09/782,434
Technology Center 2600

Decided: March 17, 2008

Before ANITA PELLMAN GROSS, MAHSHID D. SAADAT,
and KEVIN F. TURNER, *Administrative Patent Judges*.

SAADAT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1 and 3-24, which are all of the claims pending in this application as claim 2 has been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

Appellants invented a method and system for combining language model scores, for each of the most likely words in a list, generated by a language model mixture in an automatic speech recognition system with a reduced word error rate (Spec. 6-7). According to Appellants, a set of coefficients is used to combine the language model scores by dividing text data for training a plurality of sets of coefficients into partitions, and later selecting the set of coefficients for each of the most likely words in the list (Spec. 7).

Claims 1 and 11, which are representative of the claims on appeal, read as follows:

> 1. In an Automatic Speech Recognition (ASR) system having at least two language models, a method for combining language model scores generated by at least two language models, said method comprising the steps of:
>
> generating a list of most likely words for a current word in a word sequence uttered by a speaker, and acoustic scores corresponding to the most likely words;
>
> computing language model scores for each of the most likely words in the list, for each of the at least two language models;
>
> respectively and dynamically determining a set of coefficients to be used to combine the language model scores of each of the most likely words in the list, based on a context of the current word; and
>
> respectively combining the language model scores of each of the most likely words in the list to obtain a composite score for each

of the most likely words in the list, using the set of coefficients determined therefor;

wherein said determining step comprises the steps of:

dividing text data for training a plurality of sets of coefficients into partitions, depending on word counts corresponding to each of the at least two language models; and

for each of the most likely words in the list, dynamically selecting the set of coefficients from among the plurality of sets of coefficients so as to maximize the likelihood of the text data with respect to the at least two language models.

11. A method for combining language model scores generated by at least two language models comprised in an Automatic Speech Recognition (ASR) system, said method comprising the steps of:

generating a list of most likely words for a current word in a word sequence uttered by a speaker, and acoustic scores corresponding to the most likely words;

computing language model scores for each of the most likely words in the list, for each of the at least two language models;

respectively and dynamically determining a weight vector to be used to combine the language model scores of each of the most likely words in the list based on a context of the current word, the weight vector comprising n-weights, wherein n equals a number of language models in the system, and each of the n-weights depends upon history n-gram counts; and

> respectively combining the language model scores of each of the most likely words in the list to obtain a composite score for each of the most likely words in the list, using the weight vector determined therefor.

The prior art references relied upon by the Examiner in rejecting the claims on appeal are:

Goldenthal	US 5,625,749	Apr. 29, 1997
Gillick	US 6,167,377	Dec. 26, 2000

Claims 1, 3, 5-13, and 15-24 stand rejected under 35 U.S.C. § 102(e) as anticipated by Gillick.

Claims 4 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillick and Goldenthal.

Rather than repeat the arguments here, we make reference to the Briefs and the Answer for the respective positions of the Appellants and the Examiner.

We reverse.

ISSUES

1. Under 35 U.S.C § 102(e), with respect to appealed claims 1, 3, 5-13, and 15-24, does Gillick anticipate the claimed subject matter by teaching all of the claimed limitations?

2. Under 35 U.S.C § 103(a), with respect to appealed claims 4 and 14, would one of ordinary skill in the art at the time of the invention have

found it obvious to combine Gillick with Goldenthal to render the claimed invention unpatentable?

PRINCIPLES OF LAW

1. Anticipation

A rejection for anticipation requires that the four corners of a single prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation. *See Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994).

2. Obviousness

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art. *See In re Kahn*, 441 F.3d 977, 987-88 (Fed. Cir. 2006), *In re Young*, 927 F.2d 588, 591 (Fed. Cir. 1991), and *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

The Examiner can satisfy this burden by showing some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (*citing In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

ANALYSIS

1. 35 U.S.C. § 102(e) rejection of claims 1, 3, 5-13, and 15-24

Appellants contend that the portions of Gillick which the Examiner has relied on for disclosing the recited features of the claims are merely pieced together without a logical thread among the cited teachings (App. Br. 6-7; Reply Br. 2-4). Appellants specifically argue that cited portions of Gillick do not teach "determining a *set of coefficients* to be used to combine the language model scores, *based on a context of the current word*," as claimed in claim 1 (App. Br. 5). Appellants further argue that the cited portions in column 17 of Gillick merely refer to the frequency with which a word occurs in the context of a preceding word (*id.*). The Examiner responds by referring to column 16, lines 20-40 and 50-59, of Gillick and stating that the word context is taught since the disclosed equations teach updating the technique based on previous determinations (Ans. 9-10).

We agree with Appellants and find the Examiner's characterization of the coefficient equations in Gillick based on a context of the current word to be speculative and without factual support. Gillick determines a combined score from the scores produced by the language models based on interpolation weights (col. 16, ll. 8-11). However, Gillick does not specify that the determination of the coefficients is based on a context of the current word. As argued by Appellants (App. Br. 5), in the discussion of context in relation with the language models, Gillick refers to "the context of a preceding word" (col. 17, l. 41) and "the context of a preceding category" (col. 17, ll. 51-52), which are different from the claimed language "a context of the current word."

Appellants further argue that the portion of Gillick in column 15, which was relied on by the Examiner for allegedly teaching "dividing text data for training a plurality of sets of coefficients," has no logical relation with determining a set of coefficients (App. Br. 6-7; Reply Br. 3-4). Appellants further contend that Gillick "describes a function of a control/interface module that collects acoustic information from a user and *trains a user's models* based on the acoustic information" (Reply Br. 3). Appellants argue that this description of training in Gillick does not include anything regarding the training of a plurality of sets of interpolation weights, even if the interpolation weights of Gillick may be taken to be the same as the claimed set of coefficients that are used to combine the language model scores (*id.*).

Based on a review of the cited portions of Gillick, we find ourselves persuaded by Appellants' arguments that the Examiner has not pointed to any teachings in Gillick for determining the coefficients by dividing text data for training a plurality of sets of coefficients into partitions, as recited in claim 1. The claimed dividing of the text data into partitions is described in Appellants' Specification to involve determining the words on the history positions by using the last two words in a trigram to predict the current word (Spec. 22:20 – 23:3) and based on the count or frequency of the word pair in each language model (Spec. 24:9-15). This process is different from the training of the user's model in Gillick. We also disagree with the Examiner's reliance on column 16, lines 44-48, of Gillick to conclude (Ans. 10-11) that taking a part of k words to recognize the best candidate is the

same as "dividing text data for training a plurality of sets of coefficients into partitions." Therefore, as argued by Appellants, we find that the coefficients in Gillick are not trained, specifically, by dividing text data into partitions.

Therefore, considering the teachings of Gillick and the Examiner's line of reasoning based on unrelated teachings in Gillick, we find that the Examiner's conclusory statements are not sufficient for satisfying the initial burden of presenting a prima facie case of anticipation with respect to claim 1. Therefore we do not sustain the 35 U.S.C. § 102(e) rejection of independent claim 1, nor of claims 3 and 5-10 dependent thereon.

With respect to claims 11 and 19, Appellants argue that Gillick does not teach "determining a *weight vector* to be used to combine the language model scores of each of the most likely words in the list *based on a context of the current word*" (App. Br. 7). For substantially the same reasons discussed above, we agree with Appellants that the Examiner has not pointed to any teaching in Gillick that the language model scores are combined based on a context of the current word.

Appellants further question the Examiner's characterization of the claimed "*history n-gram counts*" as the counts of a given n-gram in Gillick (App. Br. 9). In support of their arguments, Appellants point to the Specification (Spec. 20:10-22) wherein a "*history* n-gram" is described as the history (i.e., the previous words) of the current word being determined *(id.)*. We find that the portions of Gillick relied on by the Examiner (Ans. 7) relate to a language model score that represents the frequency with which the pair of the words includes the list word (col. 14, ll. 26-32). Therefore,

we agree with Appellants that this description of Gillick is different from the claimed "history n-gram" as described in Appellants' Specification. In view of the analysis of Gillick and the absence of the Examiner's response to Appellants' rebuttal, we do not sustain the 35 U.S.C. § 102(e) rejection of independent claims 11 and 19, nor of claims 12, 13, 15-18, and 20-24 dependent thereon, over Gillick.

2. 35 U.S.C. § 103(a) rejection of claims 4 and 14

In rejecting claims 4 and 14, the Examiner relies on Goldenthal in addition to Gillick. However, the Examiner did not identify any teaching in this reference that can overcome the deficiencies of Gillick discussed above. Therefore, we do not sustain the 35 U.S.C. § 103(a) rejection of claims 4 and 14 over Gillick and Goldenthal.

ORDER

The decision of the Examiner rejecting claims 1 and 3-24 is reversed.

REVERSED

KIS

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